Does International Diversity Increase Innovation Performance of New Ventures from Emerging Markets?

ABSTRACT

Given international new ventures (INVs) with resource constraints and lack of international experience, whether they could take advantage of knowledge from their international diversity and be innovative? Drawn on knowledge-based view and INV literature, this study examines the relationship between international diversity and INV's innovation performance. We propose that there is an inverted U-shaped relationship between international diversity and INV's innovation performance. In addition, we also argue that such inverted U-shaped relationship between international diversity and INV's innovation performance will be weakened when INV's top management team has high level of international experience, while such U-shaped relationship will be strengthened when INV receive a high level of government subsidy. Using panel data of Chinese new ventures that are publicly listed in Growth Enterprise Market (GEM) board during the period of 2009-2015, our hypotheses are supported.

Keywords:

Small and medium enterprise; internationalization; innovation

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INTRODUCTION

Countering fierce competition from established domestic firms and foreign firms at home, innovation is of great importance to new ventures' survival and competitive advantages, especially firms in emerging countries (Zahra, Ireland, & Hitt, 2000). Compared with established firms which have substantial resources and talents to conduct in-house or global R&D, new venture firms from emerging markets with severe resource constraints are naturally in disadvantage of innovation at home (Li & Zhang, 2007; Zhou & Wu, 2014). Instead, we witnessed a burgeoning trend that new ventures (INV) from emerging countries are increasingly entering foreign countries (Xiao, Jeong, Moon, Chung, & Chung, 2013; Zhou & Wu, 2014) to leverage their learning advantage of newness (Autio, Sapienza, & Almeida, 2000) and seek for survival and growth (Dimitratos, Johnson, Slow, & Young, 2003; Sapienza, Autio, George, & Zahra, 2006; Wan, 2005). According to knowledge-based view, foreign countries are important sources of knowledge for innovation (Grant, 1996; Knight & Cavusgil, 2004; Kogut & Zander, 1994), the important but under-explored question is: *Whether new venture from emerging countries can take advantage of knowledge from their international diversity and increase innovation performance?*

Notably, the following reasons limiting our knowledge to address the above puzzle. Notwithstanding a variety of studies on international new ventures (INV) have well documented on what factors drive new venture firms to internationalize at their early age (Knight & Cavusgil, 2004; Luo, Zhao, Wang, & Xi, 2011), they implicitly assume internationalization is an extension of domestic market rather than an important source of knowledge and innovation. In light of this,

a large of studies exclusively focus on how INV's internationalization affect their performance in terms of internationalization speed, ROE, and sales growth (Zahra et al., 2000). However, new ventures, especially those from emerging countries, innovating at home seems to be a great challenge due to resource constraints, underdeveloped institutions and fierce competition (Yamakawa, Peng, & Deeds, 2008). In this sense, taking advantage of global knowledge seems to be an efficient way to increase new venture's innovation performance. Thus, combine existing INV literature with knowledge-based view, this study will address the gap and examine the relationship between international diversity and innovation performance of INV.

In this study, we propose an inversed U-shaped relationship between INV's international diversity and innovation performance. New ventures enjoy learning advantage of newness (LAN) which enables them to has less "baggage" or inertial forces that prevent it from searching and adopting new foreign knowledge , compared with older established incumbents that have well-established routines at home market (Autio et al., 2000; Sapienza et al., 2006). Through international diversity, INVs expose themselves to a diverse institutional and culture environment. The LAN enables INV to be more open to learn and try different knowledge combinations (Zahra et al., 2000). Thus, before a certain level of international diversity, INV could efficiently exploit foreign knowledge and bring back to home, and consequently increase its innovation performance. However, after a certain level of international diversity, the detriments of *knowledge overload* and *increasing coordination and managerial complexities* become more pronounced, offsetting LAN benefits of INV (Cohen & Levinthal, 1990; Zahra & George, 2002b).

Furthermore, we also expect that such inverted U-shaped relationship between international diversity and innovation performance are heterogeneous to INVs. Under resource constraints, new ventures from emerging markets normally source resources from two important

internal and external channels, namely top managers team (TMT) who are the main decision-makers in the new ventures and local government (Oviatt & McDougall, 1994). On the one hand, when TMT in new ventures has rich international experience, their foreign knowledge will substitute the necessity of searching new knowledge abroad and facilitate absorptive capacities to manage complexities associated with international diversity (Nielsen, 2010a; Sambharya, 1996). We thus expect the inversed U-shaped relationship between INV's international diversity and innovation performance is more flattened with high level of TMT's international experience.

On the other hand, new ventures usually have difficulties in successfully receiving bank loans due to liability of newness (White, Gao, & Zhang, 2005). In such a circumstance, government support, especially financial assistance through subsidies, is a major source for new ventures (Li & Zhang, 2007). When new venture with high level of government subsidy, it motivates them to try more new knowledge recombination (Li & Zhang, 2007; Li, 2009). However, the detriments of international diversity become more pronounced due to the lack of monitoring system and punishment mechanism in emerging economies for government subsidies (Bai, 2013; Hong, Feng, Wu, & Wang, 2016). We expect the inversed U-shaped relationship between INV's international diversity and innovation performance is more pronounced when new venture has high level of government subsidy. We utilized a sample of new ventures publicly listed in GEM board with a seven-year time span from 2009-2015 to test our arguments.

THEORY BACKGROUND AND HYPOTHESES

New Ventures from Emerging Markets and Their International Diversity

The fascinating phenomena of new ventures from emerging economies moving into global markets have attracted increasing academic attention (Yamakawa et al., 2008). These new ventures have some congenital incentives to conduct international operations. Different from

matured firms, they enjoys learning advantage of newness (Clercq, Sapienza, Yavuz, & Zhou, 2012), less path dependency and incumbent inertia (Bruneel, Yli-Renko, & Clarysse, 2010). Thus, they have relatively greater flexibility and less barriers in absorbing information with novelty (Sapienza et al., 2006). International expansion allows them to gain more exposure to external knowledge flows and obtain more progress by capitalizing on their unique advantages (Zahra et al., 2000).

However, compared with new ventures from developed countries or matured firms, these new ventures from emerging economies are suffering some constraints that come from multiple sources. Due to the liability of newness (Lu & Beamish, 2001), resource and capability deficiencies limit their growth and learning in domestic market to a large extent (Li & Zhang, 2007). As industrial competition grows rapidly along with the development of emerging economies, in order to avoid conflicts with dominant incumbents in their home countries, some new ventures are driven to seek for survival and profits abroad (Dawar & Frost, 1999; Yamakawa et al., 2008). In addition, emerging markets are usually weak in institutional settings and intellectual property protection (Fu, Pietrobelli, & Soete, 2011; Luo, Xue, & Han, 2010). As a result, new ventures from emerging economies are motivated to seek more efficient institutions abroad (Yamakawa et al., 2008).

As a new venture operates in global markets, its location choice and geographical distribution constitutes its international diversity (Zahra et al., 2000) that addresses the ability to operate and benefit across countries and leverage location-based advantages (Tallman & Li, 1996). The proceeding of international diversity is not only an extension of domestic market or a pursuit of survival and profits (Lu & Beamish, 2001), but also an organizational learning process that enables new ventures from emerging economies to enrich their knowledge bases and then enhance competitiveness (Birkinshaw & Hood, 1998; Dunning & Lundan, 2008). International

diversity can provide opportunities for new ventures to access to innovations located in foreign markets (Peng & Wang, 2000), and to operate exploration to develop their absorptive capacity (Zahra & George, 2002a). Each of the above motivations has been proved to be important for new ventures from emerging markets to improve their innovation performance (Rothaermel & Deeds, 2004).

The learning effect of international diversity on innovation outcomes with respect to new ventures based in emerging economies is subject to further study. Although previous theoretical development indicates the flexibility of new ventures and the potency of international diversity, considering that new ventures from emerging economies are featured with congenital constraints, the extent to which and in what boundary conditions they can innovate from such international expansion is still unclear. Hence, in the following section, we will explore how well new ventures from emerging economies can innovate through international diversity, and how top management team's international experience and government subsidy may influence the innovation effects of international diversity.

International Diversity and Innovation Performance

New ventures from emerging markets are in urgent need of absorbing external knowledge with novelty that can foster their growth. Dispersed geographic distribution brought by international diversity provides these firms with various knowledge access (Cantwell & Piscitello, 2000; Hsu, Lien, & Chen, 2015). Gaining such access allows international new ventures to identify and absorb heterogeneous knowledge, integrate with their existing knowledge bases, and create new knowledge combinations (Guo & Wang, 2014). Increasing international diversity generates more exposure to spillovers abroad (Garcia-Vega, 2006) that can facilitate new ventures' innovation.

Further, since new ventures have less inertia and path dependence than mature incumbents (Bruneel et al., 2010), when faced with new knowledge from diverse foreign markets, new ventures can rely on learning advantage of newness (Autio et al., 2000) to acquire what they need to innovate. Such learning process helps them to enlarge their knowledge pool, increases the potential of finding new solutions to problem-solving (Guo, Wang, Xie, & Shou, 2015), and then accelerates knowledge recombination and innovation rates (Kafouros, Buckley, Sharp, & Wang, 2008).

However, international diversity is never costless. Instead, the process is rather time, money, and labor consuming (Hsu et al., 2015). In a given period, external knowledge that firms are able to acquire is not infinite. Along with the increase in international diversity, the costs of knowledge acquisition from foreign countries may eventually outweigh the benefits (Filatotchev, Strange, Piesse, & Lien, 2007). Managerial complexity, tangible and intangible costs that stem from coordination and communication are growing. But managers have bounded rationality to deal with information overload (Clercq et al., 2012), and their attention as a special resource is scarce (Koput, 1997).It is particularly true for new ventures because they have less operational experiences but bear more resource constraints. Besides, new ventures' absorptive capacity is relatively weaker so that they have difficulties in effectively acquiring too much new knowledge and creating new knowledge combinations. Thus, generating innovation from a great amount of acquired knowledge seems to be a big challenge for them.

New ventures' knowledge acquisition from overseas market for innovation suffers liability of foreignness because they don't have local roots in host countries (Sofka, 2006). Although they have learning advantage of newness, being unfamiliar with institutions in foreign countries will decrease their benefits from learning in host countries and then slow down their innovation rates (Zaheer, 1995). Increasing international diversity decentralizes new ventures'

resource allocation in different host countries, making it more difficult to cope with the liability of foreignness. Heterogeneity and complexity of foreign market will become a barrier to these new ventures when they increase their international diversity to gain overseas knowledge that are valuable to innovate (Al-Laham & Amburgey, 2005). As a result, these new ventures' innovation performance will be trapped.

Based on the above arguments, we propose that for new ventures from emerging markets, increasing international diversity promotes their innovation performance up to a certain degree, mainly attributable to the learning advantage of newness. However, after a threshold, the costs will offset, and finally outweigh, the benefits that international diversity bring to innovation performance. Hence, we hypothesize that:

Hypothesis 1: For new ventures from emerging economies, there exists an inverted U-shaped relationship between international diversity and innovation performance.

The Moderating Effect of Top Management Team's International Experience

TMT's international experience and expertise is a kind of unique and valuable resource for firms (Daily, Certo, & Dan, 2000), especially international new ventures (Wehner, Schwens, & Kabst, 2015). Top managers featured by abundant international experience are more familiar with global markets, own more overseas networks (Athanassiou & Nigh, 2002), and thus possess more accesses to international knowledge sources. There's no doubt that these resources are critical for international new ventures to compete in diverse global markets. However, it is argued that, at the early stage of new ventures' international expansion, there exists substitute relationship between individual-level and firm-level international experience (Bruneel et al., 2010; Clercq et al., 2012). Although at the very start of international expansion, TMT's international experience plays a role in shaping a new venture's initial international strategy and behavior. Once the new venture begins to conduct international activities, the influence of TMT's

international experience as congenital knowledge base will be gradually substituted by the venture's own experiential learning (Bruneel et al., 2010) through international diversity. Hence, we expect that due to the existence of substitution effect, the increasing slope of international diversity on new ventures' innovation performance will be flatter.

On the contrary, when a new venture achieves a high level of international diversity, we expect that the positive effect of TMT's international experience will be explicit. As suggested in the upper echelons theory, TMT's international expertise creates the base for decision-making and ultimately firm behavior (Hambrick, 2007). The importance of having top managers who master the knowledge of the logic and dynamics of foreign markets has been highlighted (Luo, 2005). During international diversity, their internationally accumulated knowledge can be used by new ventures to enhance information processing capability (Nielsen, 2010b), reconcile conflicts between local and global markets (Bartlett & Ghoshal, 2002), cope with the complexity and turbulence of knowledge accumulation (Daily et al., 2000), as well as reduce costs that derive from coordination and knowledge combination (Clercq et al., 2012). As a result, we argue that when a new venture is faced with growing managerial costs and complexity with respect to a high level of international diversity, TMT's international experience may assist to weaken the negative side of international diversity on innovation performance.

> *Hypothesis 2: For new ventures from emerging economies,* TMT's *international experience negatively moderates the relationship between international diversity and innovation performance.*

The Moderating Effect of Government Subsidies

In the context of emerging economies, such as China, government agencies play an important role in affecting a firm's operation, as well as innovation. They not only formulate policies to regulate and coordinate innovation activities of firms, but also provide direct financial

subsidies to them (Li, 2009). Nevertheless, we argue that financial support from government is an double-edged sword for new ventures from emerging economies.

Financial support from government is one of the sources that a firm can rely on to acquire resource, especially for new ventures that are faced with resource constraints (Li & Atuahene-Gima, 2001). Government subsidies can assistant new ventures by compensating for their resource-related weakness to a certain extent when they are learning and innovating from global market. Financial support from government can also help new ventures gain access to other related resources, such as human and intellectual resources that are critical to generate innovation (Zimmerman & Zeitz, 2002). By taking advantage of various resources, in the process of international diversity, new ventures can be better at acquiring new knowledge, integrating with their knowledge bases, and obtaining more innovation outcomes.

It is suggested that financial support from the government is a process of resource allocation (Liu & White, 2001; Luo, 2003). In China, government agencies are active in directing and allocating scarce financial resources to specific industries and firms that can accelerate a region's or a nation's innovation (Li, 2009). New ventures are usually regarded as active innovators and consequently attract a large amount of financial support from the government (White et al., 2005). Innovating through international diversity is a resource-consuming activity. Such financial support can add value to a new venture's own investment and make it better at redeploying financial resources to R&D-related activities when expanding to international market.

Although expansion to different countries allows firms to decentralize potential risks, international diversity is still risky. Internationalized firms, especially new ventures, are yet faced with the threat of loss and the possibility of failure. Direct financial assistance that comes from government subsidies can lower the costs and risks of learning and innovating through

international diversity (Czarnitzki & Licht, 2006). And in this way, new ventures will feel less pressure in doing R&D-related activities in foreign countries and then achieve a better innovation performance.

However, financial support from government doesn't promote new ventures' innovation all the time. Instead, we argue that it is an double-edged sword and it will restrain a new venture's innovation when it reaches a certain level. First, it has been observed that, in emerging economies, due to a lack of monitoring and punishing system, government subsidies may be embezzled for other activities instead of R&D (Hong et al., 2016). As a result, these subsidies would not help to deal with increasing costs derive from innovation, leading to a low innovation performance. Second, too much financial support brings more complexities to managers in new ventures. Because deciding how to reallocate these subsidies occupies their limited attention. Third, government subsidies may have a crowd-out effect on new ventures' own R&D investment (Bai, 2013), thereby increasing dependence on their government and domestic market, weakening their enthusiasm of international expansion. Considering that new ventures are faced with liability of foreignness, such inertia caused by too much financial support will further do harm to their innovation performance from learning through international diversity.

To sum up, we argue that for new ventures from emerging economies, the positive influence of international diversity on innovation performance will be strengthened by government subsidies. On the contrary, too much subsidiaries will do harm to innovation performance by accelerating the negative side of diversity.

Hypothesis 3: For new ventures from emerging economies, government subsidies positively moderates the inverted U-shaped relationship between international diversity and innovation performance.

METHODOLOGY

Sample and Data Collection

This analysis is based on the firm-level data in the context of China, which has become one of the most important sources of overseas investment in recent years (Lu, Liu, & Wang, 2011). As an emerging economy, China has witnessed the surging process of internationalization in not only larger-size firms but also start-ups, allowing us to examine to effect of internationalization in entrepreneurial firm's innovation (Yamakawa et al., 2008). This study used a sample of entrepreneurial firms drawn from those publicly listed on the China's Growth Enterprise Market (GEM) board to test our hypotheses. The GEM board is the second-board market that offer security exchange for entrepreneurial firms with great potential and high-tech orientation but no access to obtain external financing from the main-board market (Qian, Wang, Geng, & Yu, 2017; Wang, Jiao, Xu, & Yang, 2018), thus it provides an ideal sample in this study. As the GEM board was officially launched in 2009 and data of firm's internationalization is available until 2015, the research period of sample starts from 2009 and ends in 2015.

After deleting data with missing observations, we then assembled an unbalanced panel dataset consisting of 1,293 firm-year observations from 376 unique entrepreneurial firms. Panel A of Table 1 summarized the sample distribution by each year, and Panel B exhibited the sample distribution by firm's characteristics including firm size, firm age, location and industry. Of all the observations, about 65.27% were of small and medium size with less than 1000 employees. About 89.86% were in business between 5 and 20 years. Observations from all 7 regions in Mainland China distribute unevenly, and most of them were mainly concentrated in East China (39.75%), South China (22.43%) and North China (18.64%). In addition, most of observations belonged to manufacturing industry (61.56%) and information technology industry (26.91%).

Insert Table 1 about here

Multiple data sources were used in this study. Data of firm-specific and TMT-specific characteristics were mainly sourced from the *China Stock Market and Accounting Research* (CSMAR) database, one of the most widely-used databases in Chinese listed firms' research (Marquis & Qian, 2013; Wang & Qian, 2011). We manually collected data such as firm's internationalization and government subsidy from the annual reports of GEM firms. We also sourced provincial-level controls from the *National Economic Research Institute* (NERI) Report, providing information on provincial market development in Mainland China (Wang & Qian, 2011).

Dependent Variable

Innovation performance. Following previous studies (Choi, Lee, & Williams, 2011; Hsu & Ziedonis, 2008; Wu, Wang, Hong, Piperopoulos, & Zhuo, 2016), innovation performance was measured as the number of patents granted to the parent firms in Mainland China in a specific year. We used domestic patent data rather than the patents granted overseas in order to better capture parent firms' innovation output through knowledge acquisition from subsidiaries without interference caused by subsidiaries' own innovation output. There are three types of patents in China: innovation, utility model and external design, of which patents of innovation and utility model are more considered to be a reflection of firms' innovation capability (Cheung & Ping, 2004), thus we measured data only including the patents granted as innovation and utility model in this study.

Independent Variables

International diversity. Previous studies have brought out two concepts, depth and breadth, to capture the process of firms' internationalization (Gaur, Ma, & Ding, 2018; Hitt,

Hoskisson, & Kim, 1997; Lu & Beamish, 2004). In line with knowledge management and innovation literature, market engagement and international operation are more often operationalized to measure the depth and breadth of internationalization rather than financial figures such as foreign sales and foreign assets. This is because the unidimensional construct based on financial or accounting-based figures undermines the nature of corporate strategic decisions made based on the foreign market conditions and the complexity of intra-firm network within an MNEs (Hitt et al., 1997; Sullivan, 1994). In this study, we followed similar literature and focused on the operation characteristics of firms' overseas subsidiaries to measure the degree of firms' international diversity. Specifically, as the new ventures lack resources and deep understanding in new markets and institutions, the breadth of foreign involvement is more important to a new venture than the depth (Gabrielsson & Kirpalani, 2004; Pangarkar, 2008; Westhead, Wright, & Ucbasaran, 2001), thus we only used the breadth to measure the degree of international diversity. In this study, the international diversity was measured as the number of overseas countries in which the firm's subsidiaries entry and operate (Maitland, Rose, & Nicholas, 2005; Zahra et al., 2000). The data of international diversity was manually collected from the annual reports of GEM firms.

TMT international experience. We followed a large number of similar studies (Li, Vertinsky, & Li, 2014; Nielsen & Nielsen, 2013; Sambharya, 1996), and measured TMT international experience as the ratio of the number of TMT members with overseas experience to all members. This measure is time varying and TMT member specific, capturing the personal international experience including overseas education experience and overseas work experience.

Government subsidy. Government subsidy was measured as the natural logarithm of the amount of subsidy obtained from the government in a given year (Lee, Walker, & Zeng, 2017). We manually collected data for this variable from the annual reports of GEM firms.

Control Variables

We carefully selected control a set of variables at TMT level, firm level and regional level to rule out factors that could have potentially confounded the relationship between internationalization and firm innovation. In terms of TMT characteristics, we control for TMT size, TMT political connection, and TMT ownership. *TMT size* was measured as the count number of TMT members. The size of TMT allows firms, especially new ventures, to access, process and assimilate knowledge from external sources (Dai, Byun, Chok, & Ding, 2017; Maes & Sels, 2014). *TMT political connection* was a dummy variable, equaled to 1 if at least one TMT member previously served or is currently serving as a delegate at the national level or regional level of the government, the People's Congress or the Chinese People's Political Consultative Conference (Chen, Li, Su, & Sun, 2011; Li & Zhang, 2010). *TMT ownership* was measured as the percentage of firm shares held by the entire members of TMT (Kroll, Walters, & Le, 2007). The level of TMT ownership has been proved to affect the internationalization of new ventures and SMEs (George, Wiklund, & Zahra, 2005).

To account for firm influences, we first controlled for *firm size*, measured as the number of a firm's employees. As this variable is highly skewed, we took a natural logarithm transformation of this variable (Berchicci, Dowell, & King, 2012). Firm with larger size have more resources and enjoy better absorptive capacity from external knowledge (Scherer, 1965). *Firm age* was measured as the number of years since the firm was established. Firms with different ages have different level of risk tolerance, so that young firms are more likely to assume high risks on innovate than mature firms (Coad, Segarra, & Teruel, 2016; Huergo & Jaumandreu, 2004). *Financial slack* was measured as the measured as the current assets scaled by current liability. We controlled slack for the influences of resource expenditure on innovation (Kim, Kim, & Lee, 2008). *Financial performance* was employed by the Tobin's Q, which is calculated

as the ratio of firm's market value to firm's asset replacement costs (Brainard & Tobin, 1968; Petrenko, Aime, Ridge, & Hill, 2016). Arguably, firms with better prior financial performance are more likely to innovate (Rosenbusch, Brinckmann, & Bausch, 2011). In addition, because it takes time for firms to accumulate multinational operation experience to enhance the absorbing capacity of knowledge (Wu et al., 2016), we included a variable, *foreign presence*, which was measured as the number of the years in which the firm has been established overseas subsidiaries. Considering that the expenditure in research and development (R&D) has been proved to affect innovation output directly (Becker & Dietz, 2004; Hitt, Hoskisson, Ireland, & Harrison, 1991), we controlled for *R&D intensity*, measured as the natural logarithm of the amount of R&D investment. Similarly, as exporting firms are usually exposed to new technology and knowledge overseas so as to enhance innovation performance (Xie & Li, 2018), we also included *export intensity*, measured as the ratio of export sales to total sales in a given year.

Because of the uneven market development of the economy and institutional infrastructure across regions in China, we controlled for the *marketization index*. The index was assessed and published from the National Economic Research Institute (NERI) in 2016 (Wang, Fan, & Yu, 2017), to indicate the heterogeneity of institutional development across all 31 provinces, autonomous regions, and municipalities in China (Jia & Mayer, 2017; Wang & Qian, 2011). Finally, we included the industry, province, and year dummies to control for the unobserved heterogeneities at these levels (Xie & Li, 2018).

Model Specification

The sample in this study has a panel data structure and the dependent variable, innovation performance, is a continuous variable, thus a generalized least squares (GLS) technique was employed to test the hypotheses. In addition, we conducted the Hausman test to choose between fixed-effect and random-effect specification. Results from the Hausman test suggest that random-

effect specification is more appropriate ($\rho = 0.058$), hence we adopted random-effect panel GLS estimates to analyze the effect of firms' international diversity on innovation performance (Hausman, 1978). The model specification was estimated as the following Eq. (1).

Innovation performance$_{t+1}$

$$
\begin{aligned}
= \beta_0 &+ \beta_1 International\ diversity_t \\
&+ \beta_2 TMT\ international\ experience_t + \beta_3 Government\ subsidy_t \\
&+ \beta_4 International\ diversity_t \times TMT\ international\ experience_t \\
&+ \beta_5 International\ diversity_t \times Government\ subsidy_t + Controls_t \\
&+ \varepsilon_t
\end{aligned}
\tag{1}
$$

where β_1, the coefficient of international diversity, is the focus of interest in terms of Hypothesis 1; β_4 and β_5 are the coefficients of the interactions between international diversity and two moderators; $Controls$ are a set of control variables; ε is an error term. Meanwhile, we standardized all of variables and lagged one year between the dependent variable and independent variables.

RESULTS

The results of the descriptive statistics including the mean and standard variance and a correlation matrix describing all variables are present in Table 2. Innovation performance was found to positively correlated to international diversity and the square term of international diversity at the significant level. Except for the linear term and square term of the independent variable, the correlations between any other two explanatory variables remain at a relatively low level (less than 0.5). In addition, we calculated the variance inflation factors (VIFs) and found that the mean VIF was around 1.17. The maximum VIF was under 1.40 (international diversity),

which is substantially below the rule-of-thumb cutoff of 10 (Ryan, 1997). Therefore, multicollinearity is not a serious concern in this study.

Insert Table 2 about here

Table 3 reports the panel GLS estimation on innovation performance. In the table, Model 1 is the baseline model including only control variables. We then added the linear term of independent variable in Model 2 and the square term of independent variable in Model 3 to test Hypothesis 1. In Model 4 and Model 5 we added the interaction terms to test the moderating effects of TMT international experience and government subsidy respectively. Model 6 is the full model including all the explanatory variables and all the interaction terms.

Hypothesis 1 predicts an inverted U-shaped relationship between new ventures' international diversity and its innovation performance. As shown in Model 2, the linear term of international diversity was significant ($\beta = 2.25, \rho = 0.019$), suggesting a positive relationship between international diversity and innovation performance under the significant level of 0.05. However, after adding the square term of international diversity, the coefficients on the linear term ($\beta = 6.02, \rho = 0.000$) and the square term ($\beta = -0.73, \rho = 0.004$) were both significant. In comparison, the higher significant level in Model 3 than that in Model 2 suggests that the nonlinear relationship is more appropriate. The linear terms were positive, whereas the squared terms were negative, indicating an inverted U-shaped relationship. Thus, Hypothesis 1 was strongly supported.

We tested two moderating effects in Hypothesis 2 and Hypothesis 3. Hypothesis 2 predicts that TMT international experience can flatten the inverted U-shaped relationship between international diversity and innovation performance. In Model 4, the interaction term between international diversity and TMT international experience was negative ($\beta = -3.14$) and

significant ($\rho = 0.006$), whereas the interaction term between international diversity squared and TMT international experience was positive ($\beta = 2.69$) and significant ($\rho = 0.045$). Thus, Hypothesis 2 received strong support. Hypothesis 3 predicts that government subsidy can strengthen the inverted U-shaped relationship between international diversity and innovation performance. In Model 5, the interaction term between international diversity and government subsidy was positive ($\beta = 5.80$) and significant ($\rho = 0.000$), whereas the interaction term between international diversity squared and government subsidy was negative ($\beta = -2.78$) and significant ($\rho = 0.049$). Thus, Hypothesis 3 also received strong support.

Insert Table 3 about here

To interpret these results better, we used the plotting approach of marginal effects to plot the inverted U-shaped relationship and two moderating effects. Figure 1 shows that new ventures' innovation performance first increases and then decreases due to the increase of international diversity. Following the previous studies (Haans, Pieters, & He, 2016), we checked that the turning point is located well in the data range, suggesting a valid inverse U-shaped curve in our study. The significant moderating effects were plotted in Figure 2. Figure 2a shows that the relationship between international diversity and innovation performance is more flattened with the higher levels of TMT international experience, confirming an attenuated moderating effect of TMT international experience. In contrast, the relationship tends to become more strengthened with the higher levels of government subsidy, confirming an enhanced moderating effect of government subsidy.

Insert Figure 1 & 2 about here

Robustness Check

We conducted several additional analyses to test whether the results generated from the previous analyses are robust. Following previous studies (Qian, Khoury, Peng, & Qian, 2010; Zhou & Wu, 2010), we first conduct to confirm whether observed relationship is indeed quadratic. After adding the cubic term of international diversity, we found that the coefficient on the cubic term was not significant ($\rho = 0.788$), suggesting that the cubic term did not improve model fit, and thus an inverted U-shaped relationship received strong support. We then split the data to conduct another robustness check. Based on the method of Haans et al. (2016), we split two subsamples based on the empirically determined turning point (international diversity = 4.12) to check whether two separate linear regressions are consistent with the predicted shape of the curve. The results suggested that the linear relationship for the subsample below the turning point was positive, while the relationship for the subsample above the turning point was negative, suggesting the same shape of the curve in our analysis. Thus, we confirmed that our results are robust.

Furthermore, we conducted the alternative measure of the key variables to test whether the results generated from the main analysis are robust. We used the number of foreign subsidiaries operated in the specific year as the alternative measure of the international diversity to test the hypotheses (Ramaswamy, 1993; Tallman & Li, 1996). The results of these robustness analyses are reported in Table 4. As shown in Model 8, the linear term of international diversity was not significant ($\beta = 0.38, \rho = 0.497$), while the coefficients on the linear term ($\beta = 3.32, \rho = 0.003$) and the square term ($\beta = -0.26, \rho = 0.002$) in Model 9 were both significant. All the results of moderating effects in Model 10 and 11 also remained the same. All these suggest that our results are robust.

Insert Table 4 about here

DISCUSSION

Summary of Findings

This study provides empirical evidence that international diversity doesn't promote a new venture's innovation performance all the time. Instead, we assume that there is a nonlinear relationship between international diversity and innovation for new ventures from emerging economies. Using secondary data from publicly listed new ventures in GEM board, we have found that the inversed U-shaped relationship indeed exist between international diversity and innovation performance.

Out empirical results also reveal that this curvilinear relationship depends on TMT's international experience and government subsidy as boundary conditions. And these two contingencies play different roles in shaping the relationship between international diversity and innovation performance for new ventures. Accordingly, the former plays a negative moderating role that makes the U shape more flattened, while the latter has a positive effect that leads to a steeper curve.

Theoretical Contributions

This study contributes to the literature in several substantial ways. First, a major contribution of this paper is integrating the insights of international new venture and innovation literature, by theoretically developing the conceptual model for examining the inverted U-shaped relationship between international diversity and innovation performance. Previous studies have well investigated the motivations of new venture's international expansion, and the performance

effects in terms of internationalization speed, ROE, and sales growth. In this study, we address this gap by focusing on new ventures' innovation performance and showing that it is curvilinearly influenced by international diversity.

Apart from the curvilinear relationship, we also identify some boundary conditions for the relationship between international diversity and innovation performance of new ventures. TMT's prior international experience and government subsidy play divergent moderating roles. These findings validates the contingent perspective of internationalization and innovation performance (Hsu et al., 2015), and indicates the double-edged effects of TMT's international experience and financial assistance from government.

Finally, our empirical analysis was conducted in the context of China as the largest emerging economy. Therefore, the empirical results make contribution to extending the literature by indicating that when new ventures from emerging economies try to learn and innovate from foreign markets, international diversity doesn't always accelerate innovation performance. Additionally, TMT's international experience and government subsidy are important contingencies that should be considered.

Managerial and Policy Implications

The findings in this study have some implications for practitioners in both management and policy-making. First, for new venture managers, international diversity not only brings opportunities for technological learning and knowledge integrating, but also leads to information overload and increasing risks. To achieve a higher degree of innovation outcomes, managers are suggested to evaluate their ventures' conditions in a dynamic manner, trade-off between benefits and costs as their ventures expand internationally, and nurture skills of information processing that ensure effective integration of learning.

Second, at the early stage of international diversity, the substitute effect between international experience of top managers and new ventures should be noticed. New ventures should accumulate their own international experience which is more accurate and timely, to establish a more adaptive and flexible structure that fosters innovative outcomes. After a threshold, managers should fully use their internationally accumulated knowledge to help their new ventures cope with complexity and uncertainty arise from international diversity.

Third, although government subsidy is an important source of financial resource for new ventures, private investment in R&D is still necessary to improve firm-level absorptive capacity that fosters knowledge acquisition and recombination.

Finally, it is indicated that too much government subsidy brings burden and barrier to new ventures. A modest amount of subsidy is appreciated for policy makers. Besides, the phenomena of embezzling subsidy require improvement in monitoring system and punishment mechanism. Furthermore, in order to avoid potential over-dependence on government subsidy, introducing market mechanism to stimulate international new ventures' innovation should be taken into consideration.

Limitations and Future Directions

Several limitations of this study and directions for future research should be acknowledged. First, due to the compilation of the CSMAR database, TMT's international experience includes both international assignment and study experience, and we cannot make an effective distinction between them at present. Although some empirical data indicates that TMT's experience of international education and working abroad are highly correlated and can be integrated to form a single measure (Hsu, Chen, & Cheng, 2013), we still suggest future research to use alternative databases to explore whether any variations exist between these two kinds of experience.

Second, because of the research question, this study only focuses on international new ventures' innovation from global markets, namely their innovation outcomes patented in home country. It is worth nothing that international ventures are increasingly patenting in home and host countries to form a global intellectual property strategy (Hsu et al., 2015). Hence, future studies are suggested to collect international patent data by incorporating sources and to measure innovation performance of international new ventures in a more comprehensive way.

CONCLUSIONS

This study sheds new lights on the complex linkages between international diversity, TMT's international experience, government subsidy, and innovation performance in the context of new ventures from emerging economies. By examining longitudinal data from publicly traded new ventures in China, our findings reveal that there is an inverted U-shaped relationship between international diversity and innovation performance. The inversed U-shaped curve will be more flattened by TMT's international experience, but become steeper under the moderating effect of government subsidy. Overall, the findings imply that in order to gain superior innovation performance through internationalization, managers from new ventures should effectively balance their geographical distribution as their firms expand internationally, and establish a synergy with TMT's international experience and government subsidy.

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TABLE 1
Sample Description

Panel A: Sample of the year distribution					
	2010	2011	2012	2013	2014
Number of firms listed on GEM board	188	293	355	379	419
Available firms in the analyzed sample	124	232	303	300	334

Panel B: Sample distribution by characteristics		
	No. of obs.	% of obs.
Number of employees		
Small (<300)	141	10.90
Medium (300-1000)	703	54.37
Large (>1000)	449	34.73
Age		
<5 years	102	7.89
5-10 years	502	38.82
10-20 years	660	51.04
above 20 years	29	2.24
Location		
Northeast China	41	3.17
Northwest China	47	3.63
North China	241	18.64
East China	514	39.75
Central China	109	8.43
South China	290	22.43
Southwest China	51	3.94
Industry		
Agriculture, forestry, husbandry, and fisher	10	0.77
Mining	13	1.01
Manufacturing	796	61.56
Production and supply of electricity and tap water	6	0.46
Construction	18	1.39
Transportation and warehousing	4	0.31
Information technology	348	26.91
Wholesale and retail	11	0.85
Research and technique development	73	5.65
Culture and sports	14	1.08

TABLE 2
Descriptive Statistics and Correlation Matrix

	Variables	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	Innovation diversity	18.78	25.73															
2.	International diversity	0.38	0.94	0.19														
3.	International diversity squared	1.02	5.29	0.07	0.81													
4.	TMT international experience	0.07	0.11	-0.01	0.19	0.13												
5.	Government subsidy	15.37	1.46	0.21	0.13	0.10	0.04											
6.	TMT size	6.18	1.96	0.10	0.05	-0.00	0.02	0.09										
7.	TMT political connection	0.40	0.49	-0.01	0.04	0.03	0.00	0.07	0.14									
8.	TMT ownership	0.20	0.20	0.03	0.02	0.00	-0.02	-0.10	0.11	0.05								
9.	Firm size	6.63	0.76	0.30	0.25	0.15	0.01	0.21	0.24	0.05	-0.03							
10.	Firm age	10.91	4.36	0.03	0.04	0.03	0.02	0.02	-0.03	-0.03	-0.03	-0.05						
11.	Financial slack	6.95	9.00	-0.10	-0.08	-0.05	0.03	-0.04	-0.06	-0.03	0.11	-0.29	-0.10					
12.	Financial performance	2.83	1.60	-0.03	-0.07	-0.04	0.08	0.07	-0.01	-0.09	0.09	-0.08	0.00	0.15				
13.	Foreign presence	2.78	4.88	0.18	0.45	0.21	0.08	0.06	0.03	-0.00	0.07	0.17	0.18	-0.03	-0.00			
14.	R&D intensity	16.97	1.24	0.21	0.17	0.10	0.09	0.18	0.21	-0.05	-0.02	0.33	0.00	-0.06	-0.01	0.09		
15.	Export intensity	11.58	8.42	0.21	0.25	0.13	0.10	0.06	-0.12	0.04	-0.03	0.18	-0.07	-0.13	-0.15	0.21	0.05	
16.	Marketization index	9.71	1.68	0.03	0.09	0.08	0.03	-0.00	-0.04	-0.09	0.10	0.03	0.06	-0.02	-0.03	0.08	0.10	0.12

Notes: $N = 1,293$; correlations greater than |0.06| are significant at 0.05.

TABLE 3
Random-effect Panel GLS Estimation of International Diversity on Innovation Performance

|	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Hypothesis 1:												
International diversity			2.29*	(0.97)	6.02***	(1.60)	7.95***	(1.86)	3.58†	(2.10)	4.07†	(2.10)
International diversity squared					-0.73**	(0.25)	-1.14**	(0.37)	-0.56	(0.50)	-0.45	(0.50)
Hypothesis 2:												
International diversity × TMT international experience							-3.14**	(1.15)			-5.21***	(1.37)
International diversity squared × TMT international experience							2.69*	(1.34)			5.53***	(1.70)
Hypothesis 3:												
International diversity × Government subsidy									5.80***	(1.20)	7.67***	(1.33)
International diversity squared × Government subsidy									-2.78*	(1.41)	-6.31***	(1.79)
Control variables:												
TMT international experience	-10.63	(7.77)	-12.64	(7.82)	-12.56	(7.79)	-8.57	(7.93)	-11.89	(7.69)	-6.90	(7.81)
Government subsidy	1.19**	(0.43)	1.15**	(0.43)	1.16**	(0.42)	1.15**	(0.43)	1.74***	(0.43)	1.73***	(0.43)
TMT size	0.50	(0.41)	0.55	(0.41)	0.53	(0.41)	0.58	(0.41)	0.44	(0.40)	0.52	(0.40)
TMT political connection	-0.54	(1.81)	-0.55	(1.81)	-0.70	(1.80)	-0.60	(1.80)	-0.73	(1.78)	-0.58	(1.78)
TMT ownership	2.96	(4.54)	2.88	(4.54)	2.80	(4.53)	3.00	(4.52)	3.40	(4.46)	3.41	(4.44)
Firm size	6.85***	(1.45)	6.67***	(1.45)	6.47***	(1.45)	6.41***	(1.45)	6.37***	(1.43)	6.23***	(1.42)
Firm age	-0.07	(0.29)	-0.03	(0.29)	-0.01	(0.29)	0.03	(0.29)	0.02	(0.28)	0.02	(0.28)
Financial slack	0.08	(0.09)	0.09	(0.09)	0.09	(0.09)	0.09	(0.09)	0.07	(0.09)	0.08	(0.09)
Financial performance	-0.02	(0.51)	0.04	(0.51)	0.03	(0.51)	0.03	(0.51)	-0.05	(0.50)	-0.07	(0.50)
Foreign presence	0.56*	(0.25)	0.36	(0.26)	0.23	(0.27)	0.18	(0.27)	0.31	(0.26)	0.31	(0.26)
R&D intensity	2.39**	(0.87)	2.25*	(0.87)	2.42**	(0.87)	2.31**	(0.87)	2.27**	(0.86)	2.19*	(0.85)
Export intensity	0.38***	(0.11)	0.35**	(0.11)	0.33**	(0.11)	0.31**	(0.11)	0.35**	(0.11)	0.34**	(0.11)
Marketization index	-2.04	(4.35)	-2.13	(4.36)	-2.28	(4.35)	-2.41	(4.35)	-2.12	(4.25)	-2.26	(4.23)
Constant	-98.39†	(51.62)	-93.11†	(51.83)	-92.44†	(51.72)	-88.95†	(51.73)	-98.94†	(50.60)	-95.48†	(50.36)
Wald χ^2	232.91***		238.85***		248.75***		257.97***		286.23***		303.99***	
Overall R^2	0.205		0.209		0.216		0.224		0.251		0.262	
Number of observations	1,293		1,293		1,293		1,293		1,293		1,293	

Notes: †p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001. Standard errors are in parenthesis. Year dummies, provincial dummies and industry dummies were included in all models.

TABLE 4
Robustness Check on the Additional Measure of International Diversity

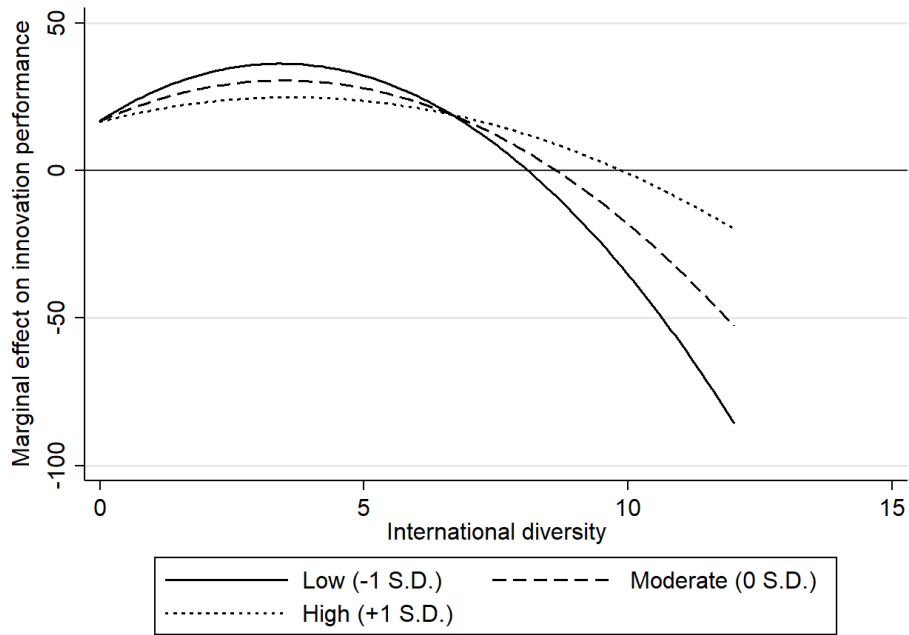|	Model 7		Model 8		Model 9		Model 10		Model 11		Model 12	
Hypothesis 1:												
International diversity (subsidiary)			0.38	(0.56)	3.32**	(1.11)	4.39***	(1.24)	1.02	(1.25)	2.32†	(1.30)
International diversity squared (subsidiary)					-0.26**	(0.09)	-0.37***	(0.11)	-0.10	(0.10)	-0.22*	(0.11)
Hypothesis 2:												
International diversity × TMT international experience							-2.28*	(1.04)			-3.79***	(1.13)
International diversity squared × TMT international experience							2.31†	(1.22)			4.88***	(1.49)
Hypothesis 3:												
International diversity × Government subsidy									5.48***	(1.25)	6.66***	(1.30)
International diversity squared × Government subsidy									-3.81***	(1.10)	-5.89***	(1.30)
Control variables:												
TMT international experience	-10.63	(7.77)	-11.12	(7.81)	-11.45	(7.79)	-8.74	(7.92)	-10.84	(7.72)	-7.09	(7.83)
Government subsidy	1.19**	(0.43)	1.18**	(0.43)	1.17**	(0.42)	1.16**	(0.42)	1.60***	(0.43)	1.63***	(0.43)
TMT size	0.50	(0.41)	0.52	(0.41)	0.51	(0.41)	0.53	(0.41)	0.42	(0.40)	0.44	(0.40)
TMT political connection	-0.54	(1.81)	-0.48	(1.81)	-0.72	(1.81)	-0.73	(1.81)	-0.83	(1.79)	-0.93	(1.78)
TMT ownership	2.96	(4.54)	2.90	(4.55)	3.20	(4.54)	3.74	(4.54)	3.43	(4.50)	4.15	(4.48)
Firm size	6.85***	(1.45)	6.83***	(1.45)	6.57***	(1.45)	6.51***	(1.45)	6.54***	(1.43)	6.44***	(1.43)
Firm age	-0.07	(0.29)	-0.06	(0.29)	-0.02	(0.29)	-0.01	(0.29)	-0.03	(0.28)	-0.02	(0.28)
Financial slack	0.08	(0.09)	0.08	(0.09)	0.09	(0.09)	0.08	(0.09)	0.07	(0.09)	0.06	(0.09)
Financial performance	-0.02	(0.51)	0.01	(0.51)	0.02	(0.51)	0.02	(0.51)	-0.01	(0.50)	-0.06	(0.50)
Foreign presence	0.56*	(0.25)	0.51*	(0.26)	0.34	(0.26)	0.29	(0.26)	0.46†	(0.26)	0.40	(0.26)
R&D intensity	2.39**	(0.87)	2.37**	(0.87)	2.42**	(0.87)	2.27**	(0.87)	2.41**	(0.86)	2.22*	(0.86)
Export intensity	0.38***	(0.11)	0.37***	(0.11)	0.35**	(0.11)	0.34**	(0.11)	0.35**	(0.11)	0.33**	(0.11)
Marketization index	-2.04	(4.35)	-2.05	(4.35)	-2.27	(4.35)	-2.39	(4.34)	-2.11	(4.28)	-2.25	(4.25)
Constant	-98.39†	(51.62)	-97.76†	(51.68)	-93.95†	(51.66)	-90.07†	(51.61)	-101.0*	(50.91)	-95.89†	(50.58)
Wald χ^2	232.91***		233.20***		243.80***		249.22***		267.38***		281.59***	
Overall R^2	0.205		0.206		0.213		0.218		0.237		0.249	
Number of observations	1,293		1,293		1,293		1,293		1,293		1,293	

Notes: †$p < 0.10$; *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$. Standard errors are in parenthesis. Year dummies, provincial dummies and industry dummies were included in all models.

FIGURE 1
The Effect of International Diversity on Innovation Performance
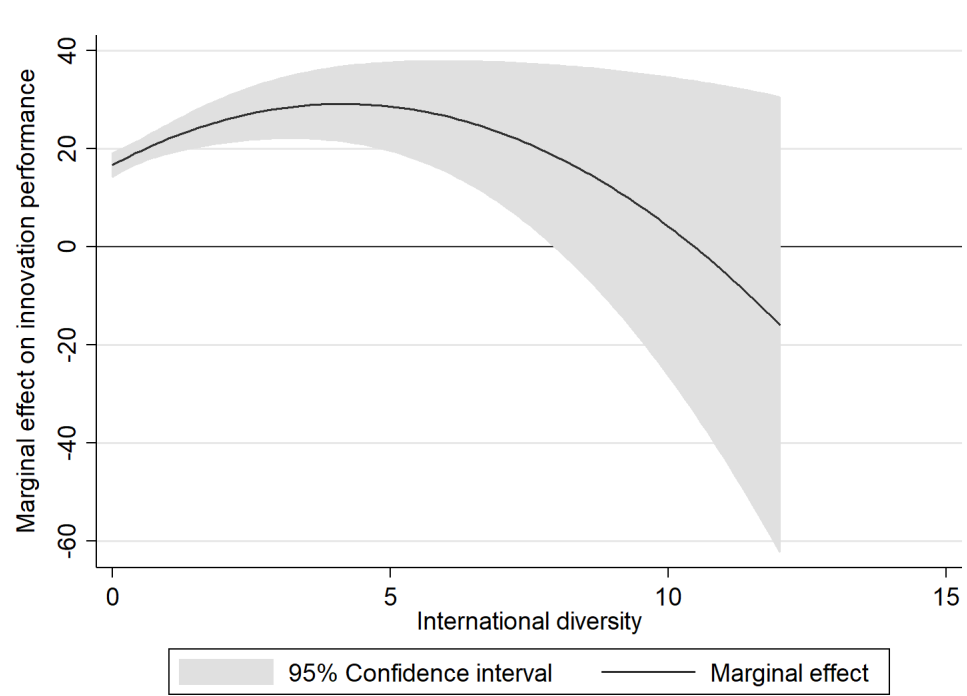
FIGURE 2
The Moderating Effect of TMT International Experience and Government Subsidy on the Relationship Between International Diversity and Innovation Performance

(a) The moderating effect of TMT international experience

(b) The moderating effect of government subsidy